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Caught in the Web? Addictive Behavior in Cyberspace and the Role of Goal-Orientation

Brief Running Title: **Addictive Behavior in Virtual Worlds**

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Abstract

New online 3-D virtual worlds are complex and differ significantly from each other. In this study we examine whether the type of virtual world is likely to make a difference on how addictive behavior develops and its subsequent outcomes. We examine the effect of goal-orientation on the degree to which cognitive absorption within the virtual world results in addiction and in the impact of addiction on continuance and purchasing intentions. Using surveys conducted in World of Warcraft (goal-oriented) and Second Life (experience-oriented) virtual worlds and analysis via ANOVA, we find that while cognitive absorption contributes to the development of addiction, which subsequently leads to increased continuance and spending intentions in goal-oriented virtual worlds, none of these relationships hold in the case of the experience-oriented world. Goal-oriented virtual worlds provide a problematic conduit for addictive behavior and marketing manipulation and the authors believe that they would benefit from further attention by policy-makers. Experience-oriented virtual worlds do not appear to provide the same dangers and would appear to be more healthy avenues for marketing-consumer engagement.

Keywords: Virtual Worlds; Addiction; Cognitive Absorption; Consumer Behavior; Goal-Orientation.

1. Introduction

“The computer industry is the only industry this author can think of that refers to their customers as users – similar to illicit drug dealers who sell their wares to their own users. This brings up the question of whether society is becoming too dependent on the computer?” [1].

As Rudi Volti [2] has observed “[our] inability to understand technology and perceive its effects on our society and on ourselves is one of the greatest, if most subtle, problems of an age that has been so heavily influenced by technological change.” Although technology can represent a force for good, it can also have deleterious implications for society. There has been considerable academic research and popular rhetoric surrounding the addictive properties of computer-mediated environments such as excessive computer and Internet usage [3,4,5,6,7], online gambling [8], and online video gameplay [9,10,11]. So-called ‘Internet addicts’ [12,13,14,15,16,17,18,19,20], with a ‘pathological’ use of the Internet, may constitute addiction or a dependency that is uncontrollable and can result in dysfunctional consequences (see, e.g. [6,9]).

In contrast, excessive usage and addiction to virtual worlds – massively multiplayer online role-playing games, such as *World of Warcraft*, *Runescape*, *Aion*, *Star Wars: The Old Republic*, *Everquest*, and *EVE Online*, and social virtual worlds where participants create businesses and communities, such as *Second Life*, *IMVU*, *3-D Chat*, *Kaneva*, *Onverse*, *There*, *Twinity* and *Blue Mars* – has been largely neglected (perhaps owing to their relatively newness). While the manifestations and consequences of addiction to cyberspace are captured imaginatively in works of popular fiction – such as the novels of William Gibson (*Neuromancer*, 1984: [21]), and Jeff Noon (*Vurt*, 1993: [22]) – our understanding of what might cause user addiction to virtual worlds is limited. Put another way: “Why does cyberspace have to be so addictive” for some users? [23].

Our purpose in the present study is to examine addiction in virtual worlds. In order to explain how deep (and possibly addictive) engagement with information technology can

manifest we draw on the concept of cognitive absorption (CA) proposed by Agarwal and Karahanna [24] to help explain IT adoption and usage, and examine the impact that virtual world addiction has on continuance and spending intentions. In order to advance our understanding of addiction in virtual worlds and communities, our analysis examines addiction against the backdrop of the *nature* of the task faced (or goal-orientation) in virtual environments. While some virtual worlds are driven by goal-oriented tasks (such as *World of Warcraft*, *EVE Online* and *Runescape*), others have greater experience qualities (such as *Second Life*, *Onverse* and *Blue Mars*). We propose that CA will have a greater impact on addiction in virtual world settings, but this relationship will be moderated by the extent to which a virtual environment is task-oriented, as this will provide greater focus and sustained challenge/interest to users. By comparing the results of two surveys ($n=662$) (one conducted in the experience-oriented virtual world *Second Life* ($n=360$), and a second conducted in the goal-oriented virtual world *World of Warcraft*, ($n=302$)) we examine the following research questions:

RQ1: What impact does CA have on addiction in goal- versus experience-oriented virtual worlds?

RQ2: What impact does addiction have on continuance intentions in goal- versus experience-oriented virtual worlds?

RQ3: What impact does addiction have on spending intentions in goal- versus experience-oriented virtual worlds?

This study is timely for a number of reasons. Scholarly research on Internet addiction is limited, while research on addiction in virtual world settings – despite their popularity – is practically non-existent [9]. An understanding of what facilitates individuals' addictive behaviors towards virtual worlds would have scholarly value but would also be of value to practitioners and public agencies with a policy setting agenda concerning consumer health and well-being. With the recent emergence and growth of social networking technologies – including the likes of *Facebook*, *Twitter*, *Google Plus*, *MySpace*, *YouTube*, *LinkedIn*, *Flickr*, *Bebo*, *DeviantArt*, *Hi5*, *Friendster*, *Tagged*, *Badoo*, *Xing*, *Orkut*, *Pinterest* and many more – a new set of channels for consumption has emerged. One such channel is that of the virtual

world (e.g. *Second Life*), which is being recognized as potentially one of the more important channels for marketplace information [25,26], as testified by the large number of diverse key brands that have attempted to create a presence there, including Toyota, Reuters, Sony-Ericsson, Dell and the rock band Oasis. Little is known, however, concerning how these emergent channels differ from existing channels and the factors that might contribute towards addiction. Given that addiction can often be harmful to the individual, then if we view virtual worlds as the new marketing and consumption landscapes of the future, it is imperative to assess the potentially deleterious effects of marketing interventions via these platforms.

The paper is organized as follows. In the next section, we provide a background to 3D virtual worlds. Next we consider addiction to computer-mediated environments and virtual worlds. We then outline the concept of cognitive absorption, and offer our hypotheses. The remainder of the study attempts to demonstrate empirically the extent to which goal-oriented virtual worlds are more likely to foster addiction than experience-oriented virtual worlds, and examine the outcomes of addiction to virtual world settings. The paper concludes with the implications of the study, including implications for public policy, and provides directions for future research.

2. Virtual worlds

2.1. Definition and scope

Billions of dollars have been invested in online and digital technologies by business in recent years [27], providing consumers new venues for interaction with businesses and other consumers [28,29]. As a consequence, in addition to the traditional ‘bricks-and-mortar’ stores, there are broadly six virtual/online means by which consumers can interact (*cf.* [30]) including:

- i. *Virtual worlds*, classified as either massively multiplayer online role-playing games (e.g. *World of Warcraft*, *Star Wars: The New Republic* and *Runescape*) or virtual economies where participants create businesses and communities (such as *Second Life*, *IMVU*, and *Twinity*).
- ii. *Chat rooms* (typically organized around special interests such as consumer and

- lifestyle issues);
- iii. *Lists* (or listservs) (theme-based email mailing lists);
- iv. *Electronic bulletin boards* (allowing participants to post group-relevant information);
- v. *Web rings* (related home pages where individuals can share information based on a single mailing list); and
- vi. *Social networking tools* (such as *MySpace*, *Facebook* and *YouTube*).

In comparison to physical and Web channels, virtual worlds are a relatively new concept and hence require explanation. Three-dimensional ‘virtual worlds’ (sometimes referred to as ‘experience worlds’) are increasingly becoming an important channel for companies to communicate with current and potential customers. These “fast-growing Internet-based simulated environments where users can not only interact with each other, but with products and services provided by businesses and individuals” [31] provide a platform for interactivity that can positively influence product knowledge, attitudes towards brands, telepresence and purchase intention [32,33,34,35]. While the Web introduced a new highly interactive medium that altered the parameters of mass and personal communication [36,37], virtual worlds stand to make an equally important impact on our daily lives and shopping behavior. As Drew Stein, CEO of Infinite Vision Media (an interactive marketing agency that worked with Dell Island in the virtual world *Second Life*), notes: “as people get more familiar with 3D experiences, the flat Web page is going to seem like a thing of the past” (reported in [31]).

As the distinction between virtual worlds (such as *Second Life*) and social networking sites (such as *Facebook*) has not been well-established in the literature it is worth delineating the differences between these two computer-mediated environments. Virtual worlds can be thought of as a distinct form of social networking site in terms of the extent of the individual’s interaction with the medium. For example, the ‘optimal experience’ achieved in terms of ‘playfulness’ or ‘flow’ experienced in a particular environment (cf. [38]) is demonstrably different between both types of site. We propose that there is a heightened sense of ‘flow’ in virtual worlds – the sense of fun attained in structured activities [36]. For flow to occur two key antecedents are necessary: the level of focused attention possible (the extent to which an individual is subsumed within the activity) and the balance between the

skills and challenges involved in the interaction [36]. We argue that virtual worlds provide greater scope of focused attention and tasks/challenges than social networking sites. There are numerous tasks in virtual worlds such as *Second Life* not necessarily available via social networking sites that represent challenges ranging from shopping (at in-world stores), commerce (e.g. real estate), ability to engage in interactive games and leisure pursuits (including museums and art galleries), and networking opportunities (e.g. via special interest groups including those affiliated to religious groups and educational institutions). If the challenge presented by a particular activity is perceived as being incongruent with the individual's level of skill then they can switch tasks or create their own. Focused attention is predicated on the capacity of the individual to become immersed in the environment. In this sense, virtual worlds provide an ideal context for focused attention as they are highly detailed, 3D-rendered, interactive environments, consistent with the optimal conditions for focused attention where the individual "...is in control of his actions, and in which there is little distinction between self and environment, between stimulus and response, or between past, present and future" [38]. Virtual worlds also provide greater 'telepresence': "...the extent to which one feels present in the mediated environment, rather than in the immediate physical environment", by creating "...an almost 'being there' experience" [39]. Therefore, virtual worlds constitute a rich visual medium with a depth of engagement and high level of interactivity not afforded by most social networking sites.

2.2. Consumption and virtual worlds

The emergence of virtual worlds encourages marketers to reflect on the body of knowledge amassed on customers based on their real-world and Internet-based shopping behavior and to question some of these tenets or widely-held axioms. As Fortin [40] notes, "A common question that generally arises when a new technology is introduced is: How does this affect what we already know about a phenomenon?" Virtual worlds – such as *Second Life* and *World of Warcraft* – capitalize on an individual's desire to inhabit alternative personalities and to occupy an anonymous 'alternative self' in a virtual environment, thus potentially changing one's identity and even behavior via an avatar – comprising not only "complex

beings created for use in a shared virtual reality but any visual representation of a user in an online community” [26]. Avatars act as proxies for the real-world-self offering the possibility for their human controller to explore “...hidden aspects of their identities” that “...differ substantially from one another and from the creator’s public self” [26]. As a consequence, consumers may behave differently in such environments than they would in real-world interactions and encounters thus providing a group of potentially new, or at least different, consumers and consumption practices.

In the case of *Second Life* – a 3D virtual world that is free to join and is created by its residents (one of the channel contexts examined in the present study) – there were approximately 29 million sign-ups to date as of May 2012 [41], with around one million unique users per month [42] engaging in leisure pursuits and trade using the in-world unit-of-trade (the Linden Dollar), which can be converted into US dollars via online currency exchanges. Consumers can disseminate information in virtual worlds through a variety of means including dialogue (via text chat, instant messaging and Voice-over-IP) with other avatars in public and through engagement in special interest groups. A number of major brands have attempted to create a presence in *Second Life* including high-tech firms (Sun Microsystems, Dell), car manufacturers (Nissan, BMW), luxury items (Armani, Hublot), service providers (IBM, Playboy), consumer goods (Sony-Ericsson, Nokia), as well as diverse others (Stanford University, the Swedish Embassy, Visit Mexico and the Weather Channel). On the basis of these attributes, virtual worlds such as *Second Life* have been identified ideal environments in which to examine consumers’ behavior [26].

Taking all of these facets into account, many of our assertions concerning consumer behavior based on ‘real-world’ actions may have to be reconsidered within the context of virtual worlds, particularly as individuals’ avatars may behave differently to their real-world alter egos. Next, we consider online gaming and addictive behavior.

2.3. *Virtual worlds, online gaming and addiction*

As noted in the preceding section, virtual worlds have grown in scale, scope and popularity in recent years, and have attracted considerable research attention. Much like the World Wide

Web, however, the pervasive influence of these technologies often comes with a less palatable side, as Ogden [43] notes: “the seemingly inexorable encroachment of the Information Superhighway into our social space has introduced us to a darker, perhaps even seamier side of the promised technotopia: a world of malevolent hackers, cyber-porn, and computer espionage.” One aspect of this ‘darker side’ is user addiction. The potentially addictive nature of virtual worlds has been the source of some speculation since their inception (much like the Internet, video games and computing in general, had previously) [3,5]. The anonymity afforded participants and potential to create a ‘virtual life’ can be a powerful escape for some users [17]. While little research has been conducted concerning the potentially addictive nature of virtual worlds, some evidence does point to this potential, as well as the potential for negative aspects of virtual worlds such as users’ harassment and manipulation of other users [44]. This is attributed to the highly immersive experience and strong states of ‘flow’ many virtual worlds and communities provide for users [17,45,46], irrespective of gender [47].

One particularly popular genus of virtual worlds is online games. The popularity of online gaming has blossomed in recent years with an almost threefold increase in market valuation from the early 2000s of approximately \$2 billion [48] to a market estimated to be worth in excess of approximately \$28 billion in 2015 [49], and an estimated 1.77 billion registered online game accounts in 2011 [50]. Rapid increases in technology (such as the ubiquity of broadband services and high-speed Internet connections, and increased gameplay sophistication and graphical interfaces) have facilitated network effects for certain online games and gameplaying communities (such as *World of Warcraft*, *EverQuest*, and the *Halo* series), witnessing the importance and prominence that online games play in the everyday lives of individuals.

It is estimated that one quarter of the leisure time of young people is spent playing video games (approximately fifteen hours per week) [51], although such estimates may be conservative. Online games are, however, not the preserve of adolescents; greater numbers of females of all ages are participating in online games as are older age groups [52]. In short,

“...online gaming has swiftly emerged as a popular and successful source of entertainment and play for people of all ages” [53].

Video games with violent content (online or otherwise) have long attracted criticism and interest from social scientists and the popular media [54,55,56,57], particularly with their potential connection to antisocial behavior. In addition to the negative aspects of violent and explicit video games and their potential influence on the behavior of individuals, concerns have also been raised by governments and consumer groups related to the addictive properties and deleterious effects that video games and online gameplay may hold [58].

Merriam-Webster's Medical Dictionary [59] defines addiction as “...an acquired mode of behavior that has become nearly or completely involuntary”. Addiction relates to a dependence on certain behaviors or substances that one may feel powerless to desist even if such behavior is perceived as intrinsically negative or destructive such as alcoholism, excessive eating, gambling, or drug abuse. Addictive behavior can also be extended to human-machine interactions, such as excessive television viewing [60,61], addictions to computing and computer programming [62,63,64], Internet use [4,6,7], video gameplay [65], and, of interest to the present study, addiction to virtual worlds and Internet-enabled online game playing [9,10,11].

For many the Internet has little or no deleterious effect, and constitutes a useful work or leisure tool [66]. The potential negative impact of the Internet on society and individuals, however, has been questioned since its inception. Reports in the popular media (e.g. [67,68]) have highlighted the potentially negative aspects of Internet usage and abuse referring variously to so-called ‘Internet addicts’, ‘Internet dependency’, and ‘problematic Internet use’ [12,13,14,15,16,17,18,19,20], as well as the ‘pathological’ use of the Internet, where excessive Internet usage may constitute an addiction or dependency that is uncontrollable and disruptive to one’s life (see, e.g. [6,9]).

The phenomenon of addiction to online video games (and computing games in general), however, is not clear-cut, particularly as it is thought to lack “...a strongly destructive element” that many other addictions possess [62] such as alcohol abuse or excessive gambling, while the same may also be true of virtual worlds in general. Defined as “an

individual's inability to control his or her use of the Internet [causing] marked distress and/or functional impairment" [69], Internet addiction is not yet a recognized DSM-IV diagnosis (*Diagnostic and Statistical Manual of Mental Disorders*¹, published by the American Psychiatric Association [71], although some practitioners believe it should be included in the forthcoming revised DSM-V edition [72]. Writing in the *American Journal of Psychiatry*, Jerald Block [72] observes that "Internet addiction appears to be a common disorder that merits inclusion in DSM-V" with its negative side-effects including "arguments, lying, poor achievement, social isolation and fatigue²" (*ibid*). Excessive Internet usage may also have some of the negative aspects of substance addiction, including poor academic performance, dysfunctional relationships with family and friends [17], alienation from the real world, insomnia, and epileptic seizures in extreme circumstances [73]. For example, Ng and Wiemer-Hastings [47] report the following interview excerpts from individuals addicted to online games:

"The game almost ruined my life, it was my life. I ceased being me; I became Madrid, the Great Shaman of the North. Thinking of it now, I almost cringe; it's so sad" and

"...the most addictive part for me was definitely the gain of power and status..."

While more recently, parent of two and journalist with the *Wall Street Journal*, Stephen Moore, bemoaned the virtual world usage of his own children [74]:

"Their compulsion became steadily more destructive. They grew increasingly withdrawn, walking around like the zombies from "Night of the Living Dead." Unless I pried them (forcibly) from the computer, they would spend five or six hours at a time absorbed in these online fantasy worlds. My wife tried to calm me down by observing that "at least they're not out having sex or doing drugs." But how would that be any worse?"

In addition, he related the experiences of neighbors with children of a similar age:

“A parent down the street confided to us that his 12-year-old son was so obsessed with video games that he wouldn't take even a three-minute break from gaming to go to the bathroom – with unfortunate results.”

While not achieving an entry in recent additions of the DSM, some commentators hold that excessive Internet usage provides a conduit for those with pre-existing addictions and problematic behaviors towards specific actions (such as to excessive gambling or pornography viewing), there remains, however, “...a total lack of methodologically sound research” to be certain [75]. In contrast, Shapira *et al.* [69] found that in a study of twenty individuals with ‘problematic’ Internet use, all subjects’ Internet use met the DSM-IV criteria for an impulse control disorder. Internet addiction might manifest in a variety of ways including: cybersex addictions (compulsive viewing of Internet pornography, adult chat rooms, and adult role-playing fantasy sites), cyber-relationship addictions (addictions to social networking and chat rooms), and net compulsions (compulsive online use including gambling, gaming, or excessive use of specific sites such as Facebook).

Although virtual worlds and online gaming can have a detrimental impact on the individual, the reality is that we know very little about the antecedents or outcomes of virtual world and online videogame addiction; it may be the case that the outcomes of addictive behavior be manifest differently than other more well-understood forms of addiction [11]. This does not mean, however, that excessive virtual world usage and online gameplay is socially benign: for example, in South Korea cardio-pulmonary deaths in Internet cafés have been attributed to excessive online gameplay³ [76,77,78,79], gameplayers have expressed concerns over the negative consequences that excessive gameplaying has had on their lives via online forums [80], while at least one clinic is now reportedly dedicated to treating videogame addiction [81]. To date, only a single study has attempted to assess the level of addiction to virtual worlds. Charlton and Danforth [9] surveyed participants in the virtual world *Asheron's Call* (a goal-oriented game) ($n=439$), finding that a staggering 28.7% of respondents could be labeled ‘addicts’.

Although perhaps easily dismissed as the domain of ‘geeks’ and ‘techies’, virtual world environments may be damaging to some of their participants. In sum, although immersion in virtual worlds and online videogames may be an important attribute of the game or virtual world ‘experience’ “...becoming too absorbed in videogames can be unhealthy and lead to addiction” [11]. Some time ago, Beard and Wolf [82] observed that “...the literature on Internet addiction is quite limited.” Although this situation has improved markedly over the last decade, with several studies assessing computer usage addiction having been undertaken [62,83], certain forms of Internet usage (in particular participation in virtual worlds) remain less understood or researched. The remainder of this study seeks to examine addiction in virtual world settings.

3. Cognitive absorption

A number of theoretical models have been proposed to help explain user acceptance of information technologies, including the diffusion of innovations theory [37,84], theory of planned behavior (TPB) [85,86], theory of reasoned action (TRA) [87] and the popular technology acceptance model (TAM) [88]. Despite some individual differences between these models, they all emphasize the importance of the role of individual beliefs as predictors of IT usage [24,89].

Although valuable in explaining IT adoption and acceptance, these models fall short of explaining *how* such beliefs towards information technologies are formed [24]. In an attempt to bridge this gap Agarwal and Karahanna [24] proposed the concept of cognitive absorption (CA). CA has the benefit of a common root with TAM and the early IT user-acceptance theories through its emphasis on instrumentality as a driver of belief, and usage behavior driven by “...cognitive complexity beliefs” [24], but is also grounded in several decades of study in the psychology literatures, where absorption refers to a predilection to experience emotional and cognitive alterations across varying situations, and openness for total engagement and attention to a particular episode [90,91].

Defined as “...a state of deep involvement with software” [24], CA is derived from three related bodies of work on individual psychology and absorption [92], cognitive engagement

[93], and flow [94], which variously emphasize high involvement and attention, complete immersion and engagement with an activity [94,95,96,97]. Agarwal and Karahanna [24] proposed CA as a powerful motivating factor towards beliefs related to IT, where highly engaging and engrossing experiences result in ‘deep attention’. CA is thought to be manifest through five dimensions [24]:

- i. Temporal dissociation (“the inability to register the passage of time while engaged in interaction”);
- ii. Focused immersion (“the experience of total engagement where other attentional demands are, in essence, ignored”);
- iii. Heightened enjoyment (“the pleasurable aspects of the interaction”);
- iv. Control (“the user's perception of being in charge of the interaction”); and
- v. Curiosity (“the extent the experience arouses an individual's sensory and cognitive curiosity”).

CA is viewed as behavior performed for its own *intrinsic* motivation (i.e. the pleasure, enjoyment, and satisfaction derived from an experience) as opposed to *extrinsic* motivation (i.e. the expectation of a reward or other outcomes associated with certain behavior). Intrinsic motivators are ultimately “...an end in themselves” [94] and may hence explain greater variance in usage intentions than extrinsic motivators [98]. In the following section we outline our hypotheses and research model related to addiction to virtual worlds.

4. Hypotheses and research model

In this section, we offer hypotheses related to: (i.) cognitive absorption and addiction; and (ii.) the consequences of addiction, in goal- versus experience-oriented virtual worlds. We now examine each of these in turn.

In most cases online gaming and participation in virtual worlds will be harmless. In some cases participation may lead to excessive usage and even addiction, as noted. Virtual worlds and online games are not likely *per se* to be addictive; virtual environments, however, will increase their potential for excessive usage and addiction in direct proportion to the degree of immersion and engagement they create for users of the virtual experience [17,45], or, put

another way, their capacity to influence CA. Environments with high levels of CA are more compelling for users, capture their total attention, and encourage involvement [24]. Hence we propose that CA is positively related to addiction in virtual world settings, as it provides some explanation of the deep state of involvement, engagement and attention that may be experienced by some individuals when interacting with computer-mediated environments. We suggest, however, that any potential link between *user* and *addiction* in computer-mediated environments is not so straightforward; the nature of the virtual *environment* and the role that the user is expected to fulfill clearly plays a role in shaping behavior and should be considered.

A useful but crucial difference dividing virtual worlds in general (and of import to the subject of addiction) is the goal-oriented nature of activities. While some virtual worlds and communities are dominated by goal-oriented systems and tasks (i.e. game-oriented), others have greater freeform qualities and parameters and are therefore more experience-oriented [99]. For example, some virtual worlds provide no clear goals or tasks *per se* [11], instead leaving the participant free to define their own interaction (e.g. *Second Life*), while other virtual worlds provide a more prescribed and task-oriented environment with relatively clear ‘missions’, ‘goals’ and levels of attainment (e.g. *World of Warcraft*). In describing the features of digital games, Klopfer *et al.* [100] suggest:

“Digital games, whether computer-, game console-, or handheld-based, are characterized by rules, goals & objectives, outcomes and feedback, conflict/competition/challenge/opposition, interaction, and representation of story [101] or more simply, “Purposeful, goal-oriented, rule-based activity that the players perceive as fun” [102]. They are distinguished by two key elements: (1) an interactive virtual playing environment, and (2) the struggle of the player against some kind of opposition.”

The authors go on to state that the goal of *World of Warcraft* is “to outfit and improve your character through quests both cooperatively and competitively with other players” [100]. Similarly, Thorne and Fischer [103] argue that:

“...thousands of players simultaneously interact, collaborate and compete. Game play is guided by goal-oriented tasks (called "quests") that increase in difficulty as players progress. Players advance their characters and improve their skills and abilities by completing quests, collecting and making items and resources, and buying and selling goods and services in the in-world market place (which is linked to global capital markets).”

In goal-oriented worlds, both social and achievement motivations can be important, although research suggests that the achievement motivation tends to be the primary driver, with group organization used as a means of achieving specific tasks [104,105].

Second Life is not a game in the sense defined by Klopfer *et al.* [100]: although it provides an interactive virtual playing environment it does not *de facto* provide a player with opposition. Similarly, quests are not provided, and skills and abilities are not developed and measured [103]. In the words of Krotosky [106]:

“Second Life is arguably distinct from goal-oriented environments like Massively Multiplayer Online Games (e.g. World of Warcraft) or social networking services (e.g. Facebook, MySpace, Bebo) because it is situated in a self-contained computer-generated 3D environment that its creators provided for participants to socialise and to collaborate in.”

Tran [107] further characterizes the differences in the two virtual worlds as follows:

“... the goal-oriented nature of WoW [World of Warcraft] is inherently different than the experience-oriented nature of SL [Second Life] ... the WoW narrative is formulated around the notion that the player must accomplish small tasks in order to increase the power of their avatar and complete the larger mission of the storyline, whereas SL is

constructed around a narrative that allows the player freedom to inhabit virtual world and build social connections just like people would offline.”

Thus, in summary, while goal-oriented virtual worlds create a clearly defined gameplay framework that effectively drives repetitive user actions through achievement and clear patterns of reward/punishment for outcomes, experience-oriented virtual worlds place the onus on the user creating their own framework for interaction and do not provide a clear pattern of reward/punishment for actions and outcomes [108,109].

There is a paucity of empirical research on the causes of computer game addiction [110]. However, recent evidence has indicated that structural characteristics of games can lead to addiction [110, 111, 112], including through social features, manipulation and control features, narrative and identity features, rewards and punishment features and presentation features. In particular, structural features that encourage repetitive, goal-oriented behavior, can lead to addiction [113]. King et al. [111] highlight reward delivery and social features as being particularly prevalent in qualitative studies of computer game addiction (e.g. [9, 80]). King et al. [110] found that the most prevalent structural feature influencing addiction in a study of 275 computer game players is ‘reward and punishment’, particularly through ‘leveling-up’ and ‘meta-game rewards’, which each represent the culmination of many hours of repetitive, goal-oriented behavior in a game. Indeed, these features were stronger predictors of problematic behavior than gender or age. Hsu et al. [73] found that ‘role-playing’ was the strongest predictor of addiction in MMORPGs, stating that the users’ motivation to progress their character was a key goal: “users need to spend a lot of time to progress their character because higher levels allow the characters to use more powerful equipment and skills ... The PlayOn project at Palo Alto ... found that the high level users wanted to spend as much time as they needed to level up the character” (p. 996). Clark [114] further found that players who engage in less social activity and that are more goal-oriented in their play are more likely to become addicted.

Where goal-oriented systems dominate, CA is likely to impact more strongly on addiction since they provide a greater challenge and clear tasks or levels to be achieved or

attained, in comparison to experience-oriented virtual worlds where tasks are prescribed to a greater extent by the user. Hence we propose that CA will positively impact addiction in virtual world settings, but this relationship will be moderated by the extent to which a virtual environment is task oriented:

H1a: Cognitive absorption **positively influences** addiction in goal-oriented virtual worlds.

H1b: Cognitive absorption **does not positively influence** addiction in experience-oriented virtual worlds.

Next, we consider continuance intentions (the desire to make repeat visits) in virtual world settings. Lin [89] maintains that virtual worlds have the capacity to engage users with “...total involvement, concentration and intrinsic interest which would lead to continuing use of a virtual community.” In a similar vein, Agarwal and Karahanna [24] propose that CA acts as an important determinant in influencing future behavior and intention to use IT, and, as CA increases so does usage. Again, we argue that goal-oriented virtual worlds will foster higher levels of CA and consequently encourage higher levels of continuance as a result, possibly resulting in addiction. Hence we propose:

H2a: Addiction **positively influences** continuance intention in goal-oriented virtual worlds.

H2b: Addiction **does not positively influence** continuance intention in experience-oriented virtual worlds.

Our final hypotheses relate to purchase intentions in virtual worlds. In a study of online shopping behavior, Shang *et al.* [115] found that virtual world ‘experiences’ with higher levels of CA (intrinsic motivational factors) were more important in explaining online shopping and consumption behavior than extrinsic factors. This is attributed to situations where online shopping environments more effectively capture the interest (and patronage) of users due to higher levels of engagement (by affording more enjoyable and playful experiences). Further, virtual worlds will differ in the purchase behavior of users and also the types of goods and services that are available [99]. Clearly virtual worlds with high levels of goal-orientation will also provide addicted users with an economic means of satisfying in-world goals and objectives. Therefore we propose:

H3a: Addiction **positively influences** spending intention in goal-oriented virtual worlds.

H3b: Addiction **does not positively influence** spending intention in experience-oriented virtual worlds.

The foregoing hypotheses are illustrated in the proposed research model, Fig. 1.

*** INSERT FIG. 1 ABOUT HERE ***

5. Methodology and data collection

The research design adopted by the study involved two cross-sectional, convenience samples using two self-report surveys in two virtual worlds. These were undertaken in the experience-oriented virtual world, *Second Life* (arguably one the most advanced and best known social virtual worlds), and the goal-oriented virtual world, *World of Warcraft* (the most popular MMORPG in the world, with more than 10 million subscribers in May 2012; [116]). Aspects of the methodology are now examined in further detail.

5.1. Instrument design

The research used scales from previous research for measuring the key constructs in the study (see the Appendix for the scales and items used in the surveys). The measures of cognitive absorption are based on the seminal work of Agarwal and Karahanna [24], discussed in the last section. All five subscales were used and the specific survey items were adapted to replace the “the Web” (the focus of Agarwal and Karahanna’s original study) with the specific name of the virtual worlds under investigation (“World of Warcraft” for study 1 and “Second Life” for study 2). The commonly-used measure of continuance intention was taken from the seminal study of Bhattacharjee [117]. The measure of spending intention was developed specifically for this study using three items. All items were measured on seven-point Likert scales from 1 (Strongly Disagree) to 7 (Strongly Agree), where 4 is Neutral.

The chosen scale for addiction is a truncated measure that combines items from two previous measures of addiction [53]: Horvath’s [60] measure of television addiction and Griffiths and Hunt’s [83] measure of computer game dependence. This measure has been previously refined and tested in the context of online games, with strong results for validity

and reliability [53]. There are four elements of the addiction scale: displacement, which refers to the forgoing of other activities due to computer game playing; uncontrollable play, which measures psychological features of addiction, including tolerance, withdrawal, guilt and unintended use; excessive play, which measures extreme amounts of time spent game playing; and social sanctions, which measures the detrimental effect of continued computer game playing on a user's social life. The items were reworded slightly to reflect the different domain of investigation (i.e., the virtual worlds).

In addition, data were captured for level of user interaction and involvement with the virtual world in terms of user experience (i.e. the length of time using the virtual world) and intensity of usage (measured in terms of the time spent in each virtual world per week) as well as respondent demographics (age, gender and educational attainment). The characteristics of the two samples are shown in Table 1.

*** INSERT TABLE 1 ABOUT HERE ***

5.2. Data collection and sample

The survey was conducted using an online questionnaire (via QuestionPro). Samples were collected using the assistance of two market research agencies – one operating within each virtual world. A sample of $n=300$ or more was sought from each virtual world. Within *World of Warcraft*, the agency was hired to collect a valid sample in excess of $n=300$ from its panel members, directing each of them to the URL of the questionnaire. Within *Second Life*, the selected agency was paid to broadcast a request to complete the survey to its panel members, including the URL of the survey, and an incentive of 250 Linden Dollars (approx. US\$0.95) was paid for each response. After filtering for duplicates and invalid responses, a total sample of $n=662$ was collected, broadly split between the two virtual worlds (*World of Warcraft*, $n=302$; *Second Life*, $n=360$).

The demographic profile of respondents to each survey (see Table 1) suggests that while *World of Warcraft* has a preponderance of male users (61.6%), the gender balance is broadly equivalent in *Second Life*, with only a slight female majority (54.2%). The differences in gender is significant ($p<.001$). The age profile of those in the goal-oriented world (median:

25-34 years) is significantly less than that of the experience oriented world (median: 35-44 years) ($p < .001$), but the educational level is not significantly different (although a median of high school graduate or equivalent as opposed to Bachelors degree or equivalent respectively). Interestingly, the sample of *Second Life* users was significantly more experienced in using their virtual world (median: 1 to 2 years) than those of *World of Warcraft* (median: 3 to 6 months) ($p < .001$), although there was no significant difference in use intensity (median: 11 to 25 hours for both virtual worlds).

As no accurate comparative demographic profile exists (e.g. age and gender) for *Second Life* and *World of Warcraft* (or for virtual world users in general) it is not possible to be certain as to how the study sample aligns with the actual demographic profile of the virtual world users. The closest proxy for *World of Warcraft* is a recent study by Yee [118], in which 39% of US users were female, with an average age of 34.2 years, and an average weekly use of 18.1 hours. This would appear to tally rather well with our sample. In *Second Life*, the most recent comprehensive sample was collected in 2008, when the median age was 25 to 34 years [119]. Barnes and Mattsson's [120] and Barnes and Pressey's [25] more recent samples had the same age demographic. However, the gender balance is similar to other recent studies – 49% female in Barnes and Mattsson [120] and 48% in Barnes and Pressey [25] – as is the use intensity profile: the median weekly usage was 10-30 hours in Barnes and Mattsson [120]. Overall, it is clear that the sample is more representative of the general public than previous studies where a strong male bias is present [9,121].

In order to assess the levels of addiction, we created three addiction groups using a method similar to Morahan-Martin and Schumacher [6], who created no, low and pathological use categories in their study of Internet use according to the number of symptoms from a 13-point scale, where pathological use required four or more symptoms. Our addiction groups were assessed in terms of the number of active symptoms from the 15-point addiction scale. In line with Morahan-Martin and Schumacher [6] and Charlton and Danforth [9], for a symptom to be active, an item was required to have a Likert scale response in excess of the mid-point (4). The groups were: no addiction (no symptoms), low addiction (1 to 5 symptoms) and high addiction (6 or more symptoms). Our scale is slightly

more demanding in that it requires six or more symptoms from 15 compared to four or more from 13 in Morahan-Martin and Schumacher's [6] study.

5.3. Validity and reliability of data

The collected data were examined for validity and reliability using standard metrics. In terms of convergent validity, all the items loaded on their respective measures at the 0.1% level of significance. Similarly, the values of Cronbach's α are very good, being well above the recommended minimum reliability values of 0.70 [122] and can be found in the Appendix. A standard test was used to examine discriminant validity: the square-root of average variance extracted for each construct was compared with the correlations between it and other constructs. Each construct shared greater variance with its own measurement items than with constructs having different measurement items.

In order to ensure that multicollinearity was not an issue we computed the variance inflation factor (VIF) between each of the variables, running separate analyses for one variable as the dependent variable and all others as independent variables. The values of VIF ranged from 1.00 to 2.25 and the values of tolerance ranged from 0.44 to 1.00 across the two samples. None of the values of the VIF exceeded the recommended maximum level of 5, nor did any of the tolerance levels fall below the suggested cut-off of 0.2; thus multicollinearity did not appear to be an issue.

Common method bias was examined using Harman's single factor test. The first factor explained only 26% of the variance for the WoW sample and 29% of the variance for the SL sample and thus common method bias did not appear to be present.

Overall, these tests provided us with a high degree of confidence in the scale items used in testing our model.

6. Findings and discussion

This section is divided into five parts. Initially, we examine levels of addiction in virtual worlds and the demographic profile of excessive users of virtual worlds. Next, we examine cognitive absorption and addiction for both goal- and experience oriented virtual worlds. We

then examine continuance intention and spending intention for both virtual worlds.

6.1. *Addiction and virtual worlds: a demographic profile*

Before examining the impact of CA on virtual world addiction it is important to determine the extent to which virtual worlds have participants that can be described as addicted.

Previous studies have revealed modest levels of addiction to computer-based usage. Based on their threshold of addiction in computer mediated environments, Charlton and Danforth [9] estimate that 8.4% of general computer users in Charlton's [62] study could be classified as addicted and 16% of Griffiths and Hunt's [83] study of computer game players could be described as addicted, while Charlton and Danforth's [9] study of players of the virtual world *Asheron's Call* classified 28.7% of participants as addicted. Our data suggest more alarming levels of addiction. In comparison to these studies, we estimate that 53.97% of respondents in the goal-oriented virtual world *World of Warcraft* could be classified as addicted, while in the experience-oriented *Second Life*, we find that 35.27% show signs of addiction (see Table 2)⁴.

*** INSERT TABLE 2 ABOUT HERE ***

It is important to note important methodological differences in data collection in these previous studies as compared to the present study: Charlton's study surveyed college student users of computers in general undertaking higher education courses, whereas Griffiths and Hunt's study surveyed young computer game players at a school, and different scales measuring addiction were also employed in these two studies and the present study. Our study is most comparable to Charlton and Danforth's [9] examination of players of the virtual world *Asheron's Call* (a goal-oriented game). The higher rates of addiction reported in the present study, however, might be attributed to the improved graphical interfaces and increased sophistication of contemporary virtual worlds, as well as improvements in computing hardware. Next, we compared addiction levels in both experience and goal-oriented virtual worlds, and find that addiction levels are significantly higher in goal-oriented virtual worlds (see Table 3).

*** INSERT TABLE 3 ABOUT HERE ***

Just why are virtual worlds so addictive? In massively Multiple Online Role-Playing

Games (MMORPGs) like *World of Warcraft* and experience worlds like *Second Life*, participants create avatars (often highly customized and outlandish) and take part in an unfolding and unpredictable storyline (particularly in goal-oriented virtual worlds and MMORPGs) or else engage in social networking, shopping, commerce, interactive games and leisure pursuits (particularly in experience-oriented virtual worlds). In *The Psychology of the Internet* [124], Patricia Wallace proposes that Internet-based activities may encourage operant conditioning due to variable-ratio schedules – the reinforcement of behavior in unpredictable situations (such as gambling or lottery playing being reinforced due to occasional winning). Virtual worlds are particularly suited to operant conditioning. Both goal- and experience-oriented virtual world platforms are unpredictable experiential contexts where rewards may occur intermittently, thus reinforcing repeat usage. In addition, positive interactions with other like-minded virtual world users might also serve as a social reinforcement to participate. In addition, as we shall shortly see, the high degree of Cognitive Absorption experienced by some users of these platforms also has a role to play in pathological Internet behavior.

We offered no hypotheses related to the levels of addiction anticipated in the virtual worlds studied, nor regarding any distinct profile of ‘addicted user’, as no compelling evidence exists to assert a plausible *a priori* argument. A demographic analysis of our samples supported these assumptions and revealed no distinct profile of virtual world participants presenting symptoms of addiction in the virtual worlds studied (see Tables 4a and b). Interestingly, virtual world addiction in the adult population is genderless, ageless, and is not linked to educational background. Perhaps these results mirror changes in Internet usage in recent years, which is no longer the preserve of adolescent males as it was traditionally [126,126], particularly in the case of online gaming [121]. Thus no particular demographic segment is more susceptible to pathological virtual world usage in contrast to earlier studies [9].

*** INSERT TABLE 4 ABOUT HERE ***

6.2. Cognitive absorption and addiction

In our second series of tests (see Tables 5 and 6), we find individuals experiencing high levels of CA in goal-oriented virtual worlds have significantly higher addiction levels ($P < .001$, $F = 69.765$) in comparison to users in experience-oriented virtual worlds ($P = .198$, $F = 1.667$) (leading us to accept *H1a* and *H1b*). Thus, while CA can act as a powerful driver of compelling computer-mediated environments, the level of task- or goal-orientation is also an important factor influencing addiction. Virtual worlds with fewer prescribed tasks, parameters and objectives, would appear to have a reduced capacity to foster addiction in comparison to virtual worlds with clearer levels of attainment, *ceteris paribus*.

*** INSERT TABLE 5 AND 6 ABOUT HERE ***

High levels of engagement with a medium or behavior and usage are not the same as addiction [62]; users with high engagement, for example, do not have the withdrawal symptoms experienced by addicts, but are in pursuit of enjoyment and diversion⁵ [9]. This said, we find that CA (as moderated by the goal-oriented nature of a virtual world) can facilitate higher levels of addiction. The reverse also would appear to be true: lower levels of both CA and addiction are observed in experience-oriented worlds. Hence high engagement *per se* will not normally lead to addiction, but the combination of high CA and goal-orientation results in higher reported levels of addiction and pathological usage. Therefore, the intrinsic motivation [94] that virtual worlds provide as well as the “...deep involvement” and “attention” [24], can lead to addiction in some users.

6.3. Addiction and continuance intention

Next, we examined the extent to which addiction influences continuance intention, or the desire to make repeat visits to a virtual world. Our results (see Tables 7 and 8) indicate that individuals with high continuance intention in goal-oriented virtual worlds are more likely to have higher addiction levels ($P < .001$, $F = 83.047$), than individuals in experience-oriented virtual worlds ($P = .962$, $F = .002$) (leading us to accept *H2a* and *H2b*). This would suggest that although in the short-term some users may find freeform virtual worlds addictive, the absence of clear goals and challenges in the medium- to long-term may discourage repeat usage.

Hence experience oriented virtual worlds may encourage ‘transient addiction’ – an intense desire to engage with a virtual world in a relatively short timeframe that does not endure over longer periods of time in comparison to virtual worlds with a stronger goal-orientation.

*** INSERT TABLES 7 AND 8 ABOUT HERE ***

6.4. *Addiction and spending intention*

Our final series of hypotheses examined the relationship between addiction, goal orientation, and spending intentions (see Tables 9 and 10). We find that individuals with higher levels of spending intentions in goal-oriented virtual worlds have higher levels of addiction ($P < .001$, $F = 103.529$), than users of experience-oriented virtual worlds ($P = .134$, $F = 2.256$) (hence *H3a* and *H3b* are both accepted). Similar to our preceding results and discussion related to *H2a* and *H2b*, we propose that addiction may encourage purchase intentions in a general sense, but the absence of clear goals and tasks (in addition to high levels of CA) is unlikely to lead to sustained intentions to purchase.

*** INSERT TABLES 9 AND 10 ABOUT HERE ***

Based on the tests conducted, the results of the hypothesized outcomes are summarized below (see Table 11). Evidence is offered to support all hypothesized relationships. In sum, our findings offer strong support to assert that goal-oriented virtual worlds and experience-oriented worlds differ markedly for levels of cognitive absorption, addiction, continuance intention and spending intention.

*** INSERT TABLE 11 ABOUT HERE ***

7. Discussion and conclusions

“...government agencies and citizen groups ... wish to better understand the dynamics of online game play, especially those variables that lead to online game addiction” [53].

In this section, we begin with a consideration of virtual worlds and addiction. Next, we suggest policy implications based on the key findings of the study, followed by managerial

implications. We conclude with a brief consideration of the study's limitations and propose areas of future research interest.

7.1 *Virtual worlds and addiction*

Psychiatrist Ivan Goldberg coined the term 'Internet addiction disorder' (IAD) in the mid-1990s as a humorous satire, but as we see more evidence of the social harm experienced by some users reported in the media, this causes us to question the extent to which computer-mediated environments might lead to damaging pathological behavior. Although Internet addiction (and certain forms of it, such as addiction to virtual world participation) is now a concern to policymakers [58], our knowledge of pathological usage, however, is limited. As Charlton and Danforth [9] observe: "There are currently no agreed criteria for defining pathological Internet use, or other types of pathological computer use." Indeed, the pathology of individuals who engage in excessive Internet use so far eludes us, as does other negative online behaviors such as cyber-stalking and cyber-bullying.

A key question is whether such addictions are real addictions or merely *virtual* addictions? Excessive Internet and virtual world usage may be a symptom of impulse control disorders. Addiction is not restricted to substance dependence, but can include behavior, as the definition of addiction by the *Gale Encyclopedia of Medicine* [128] attests: "[addiction is] a dependence, on a *behavior or substance* that a person is powerless to stop" (emphasis added). Addiction can therefore be applied to all types of excessive behavior [60,129,130]. The immersion and engagement virtual worlds may create for their users are inducing addiction for some. More specifically, the high levels of Cognitive Absorption experienced by some participants of virtual worlds is creating a state of '*deep attention*' [24] to such an extent that some individuals present pathological symptoms of virtual world addiction.

When a particular compulsive behavior "...becomes the center of one's existence...we can then say that such a person is to all intents and purposes addicted" [61]. Addiction can be recognized when some form of withdrawal is felt such as guilt or anxiety, and an individual attempts to alleviate these symptoms by performing the behavior [9]. This results in a cycle of addiction that the individual may feel powerless to exit [131]. Given the excessive time

spent online by respondents in the present study, it is hard to not conceive that such high usage levels do not impact deleteriously on individual's lives, through introversion and social isolation. For example, one study has already showed that uncontrollable online game playing is associated with neuroticism [53].

If not an addiction, excessive Internet or virtual world usage may be analogous to other extreme forms of excessive or compulsive (and impulsive) consumption practices (extreme forms of normal consumption practices) (see [131] for a review) such as 'shopaholics' [132], impulse buying [133], compulsive buying [134], and sociopathic compulsive consumers [61], which may result in negative consequences including hiding purchases, embezzlement, bankruptcy and in some cases criminal behavior such as theft [135]. O'Guinn and Faber [136] define compulsive consumption as "a response to an un-controllable drive or desire to obtain, use, or experience a feeling, substance, or activity that leads an individual to repetitively engage in a behavior", which would seem approximate to many respondents in both our samples of virtual world usage. Interestingly, the behaviors of compulsive consumers are seen to be fairly consistent to other common forms of addictive behavior [134].

Of secondary importance is the demographic profile of the respondents to the study. While earlier studies feature a strong male bias [9,126], our sample (including our two groups of highly addicted users) displays a broader socio-demographic profile and indicates that addiction (as well as participation in virtual worlds) is more representative of society than the preserve of adolescent males. Our results also suggest that individuals exhibiting the symptoms of addiction to virtual world usage have no clear demographic profile, unlike some addictions such as pathological gambling and alcohol abuse, which tend to have a particular socio-demographic bias [135].

7.2. Policy implications

Caution should be shown in labeling an activity 'addictive', particularly in ascribing excessive virtual world usage to this category [137] when excessive virtual world usage may be due to wider issues such as impulse control disorders. This said, however, excessive

virtual world usage may lead to withdrawal and damaged personal relationships. Some guides to virtual world creation innocently advise the following: “You will want to build a world that is highly goal-oriented” [138]. While well-meaning, such advice may inadvertently be fostering higher levels of cognitive absorption in users that may lead to pathological behavior in some subjects.

The issue of the regulation of the Internet is problematic and long-standing debate in the media, and beyond the remit of the present study. Whatever label may be ascribed to excessive use of virtual worlds – virtual world dependency, habitual use, or addiction – several self-help sites can be accessed (ironically) via the Internet (including *Helpguide.org*, a non-profit organization offering advice on mental and emotional health).

Marketers may be part of the problem but can also be part of the solution. Social marketing techniques could be employed to ameliorate perceptions of virtual worlds and also to caution users of the potentially addictive properties of these types of platforms. It might also be prudent of the owners of virtual worlds to form an industry coalition to promote responsible Internet use, much like organizations such as ‘Drinkaware’ in the alcoholic beverage industry. Marketers should not be seen to be exacerbating pathological usage of virtual worlds and any social harm that may result; however, rather than waiting for government or other agencies to intervene, virtual worlds would be better served to create their own ethical use guidelines [44,138]. A topic we consider in the following sub-section.

We now live in an era where a generation of people aged under 25 have grown up with the Internet, and where 20% of college students in the US started to use the Internet between five and eight years of age [139]. With the many positives the Internet brings for study and leisure pursuits, and the positive relationships and socialization that can be created through online role-playing games [3], they also raise concerns. For example, in 2008, Deborah T. Tate, of the US Federal Communications Commission, noted: “You might find it alarming that one of the top reasons for college drop-outs in the U.S. is online gaming addiction”, citing *World of Warcraft* as a specific example [139]. With approximately 1.77 billion registered online game accounts in 2011 [50], and more than 10 million subscribers to *World of Warcraft* alone in May 2012; [116]), such concerns are likely to grow in magnitude.

Further, these issues are also global in scope, particularly given the increased global Internet-adoption rates; for example, Chinese users now represent the largest single national grouping of online videogame players resulting in public health concerns [140]. Indeed, psychologists in China have requested that the World Health Organization officially recognize Internet addiction as a legitimate clinical disorder [140], while *China Daily* reported that a 14-year-old boy was arrested for the suspected poisoning of his family members after his parents had banned him from playing videogames [141].

We are also witnessing a decline in parental views of the influence of the Internet on their children's lives in general. In 2004, 67% of parents thought that the Internet had a positive impact on the lives of their children, which had fallen to 59% in 2006 [139]; a figure which we may well see further decline in the future. Given the proliferation of mobile Internet devices including tablets, Smartphone's and other mobile devices, particularly the high uptake by teens and young adults [142], the challenges to policy-makers will therefore be unlikely to decrease, and greater pressure on software developers for further self-regulation can be anticipated.

7.3 Managerial implications

The vast majority of creators of MMORPGs endeavor to design gaming environments that are highly engaging and encourage repeat usage rather than induce addiction in users; thus, blaming developers for creating highly addictive gaming environments is misleading. Companies may, however, inadvertently be inducing addictive behavior in some users, particularly in the case of goal-oriented MMORPGs. One MMORPG designer made the following observation:

“I don't believe these designers sit down and say ‘Hey I'm going to make an unhealthy game!’ I would guess they're searching for ways to get people fired up about the game and to keep them returning to the gameworld.”

“I know there are mechanics that keep us coming back. I play and have played many

social [games] and MMORPG's that have me at their mercy ... I'm not certain my projects are designed to trigger "addiction", but I do look for ways to hook people with a story and characters that'll keep them returning to the world I've created" [143].

Against this, developers can play a responsible role in assisting – albeit a small number of – their users' potential addictive or compulsive behaviors. This provides a challenging paradox for the MMORPG industry that will have to strike a balance between highly engaging gameplay with high levels of 'flow' (cf. [38]), and games that are strongly goal-oriented that may induce addiction in some users, particularly as graphical interfaces become more sophisticated. In Europe, the current protection for users is via a self-regulated industry agreement provided by Pan European Game Information (PEGI) as part of the Interactive Software Federation of Europe (ISFE), which companies can sign-up to. PEGI currently provides guidelines including an online safety code (<http://www.pegonline.eu/en/index/>), where: "Signatories [of PEGI] shall advise users of Online Gameplay Environments under their control of the desirability of taking occasional breaks from Online Gameplay." Just how effective such messages are when contained in the 'terms and conditions' sections of online games remains to be seen. It can be conjectured that if such interventions are regarded as ineffectual for some users then developers may be encouraged to employ more direct measures such as monitoring the length of single user continuous play and the use of 'in-game' warning messages for excessive play.

7.4. Limitations and future research

Our study reports very high levels of pathological virtual world usage. Some respondents could be naturally more predisposed to goal-oriented tasks in real life, including sports or puzzle solving, and such addictive behavior may be merely *extended* into virtual world usage rather than facilitated by it. Further, excessive Internet usage may be symptomatic of other issues experienced by a subject [126], such as experiencing liminal transition through a life-changing event such as the birth of a child, divorce, or the death of a family member [144], that causes the subject to seek solace in cyberspace. Hence such individuals are attracted to

goal-oriented tasks. Further, our survey focused on two virtual worlds and so may attract more respondents addicted to that specific virtual world than in more generalized surveys to the public and may carry some degree of sampling bias. As Charlton and Danforth [9] note studies “specifically aiming to recruit people considering themselves to be ‘Internet addicts’ are bound to obtain samples in which pathological Internet users are over-represented.” We explicitly did not seek to capture respondents that considered themselves addicted to virtual world platforms, although these respondents may be *de facto* over-represented in such studies. Even so, the high levels of addiction found in the present study represent a challenge to both marketers using virtual world platforms and policymakers.

As Ogden [43] noted some time ago: “Cyberspace in all its myriad incarnations has emerged as society’s latest frontier – full of hope and promise but also fraught with peril and vulnerabilities.” While virtual worlds may constitute a new consumption landscape of the future (or indeed present), there is a need to obtain a more comprehensive understanding of some of the associated ‘perils’ of usage such as the drivers of possible addiction and the outcomes of pathological online behaviors, as well as other potentially negative consequences of virtual world usage such as the manipulation or harassment of other users [44]. In line with recent trends in the social sciences [145,146,147], future research in virtual world addiction could emphasize the actual *practices* of subjects. This could help us to better understand the practices, routines, and objects that are linked to addiction to virtual world usage.

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¹ First introduced in 1952, The DSM-IV lists all known mental disorders and currently runs to 886 pages and captures 374 disorders, and is the most favoured desk reference by clinicians. The DSM is not without its critics both concerning its admissions and omissions. For example, one interesting omission is that of psychopathy – the study of psychopaths, the exclusion of which has also attracted debate. The current DSM-V panel (due to be published in 2013) dispute the notion of Internet addiction on the basis that it is more likely a symptom of depression rather than a unique mental illness in its own right, but have agreed to include it in the DSM-V’s appendix, popularly known as the “graveyard of mental disorders” [70].

² At its annual conference, The American Medical Association has debated proposals to recognize excessive game-playing as a mental disorder.

³ Perhaps the most compelling and alarming contemporary research on Internet addiction is a study undertaken in South Korea. The researchers found that approximately 210,000 South Korean children aged 6-19 are badly affected by excessive Internet usage and require some form of treatment. More profoundly, the report estimates that 80% of these children require psychotropic medications, and 20-24% may require hospitalization [76].

⁴ As a comparison, 13% of the population is thought to have an alcohol addiction, while dependence on other psychoactive substances is thought to be approximately 5-7%, and pathological gambling has an estimated prevalence of 2-3% [123].

⁵ William Glasser [127] proposed the concept of ‘positive addiction’, noting that some activities (such as exercise or meditation) may be habit-forming but are unlikely to result in negative outcomes for the subject.

Table 1. Respondents' demographic profiles.

		WoW (n=302)		SL (n=360)	
Characteristic		Freq	%	Freq	%
Gender	Male	186	61.6	165	45.
	Female	116	38.4	195	54.
Age	18-24 yrs.	87	28.8	60	16.
	25-34 yrs.	130	43.0	102	28.
	35-44 yrs.	57	18.9	109	30.
	45-54 yrs.	23	7.6	69	19.
	55-64 yrs.	5	1.7	18	5.0
Education	<i>What is your highest level of educational achievement?</i>				
	High school (non-graduate) or below	43	14.2	2	0.6
	High school graduate or equivalent	125	41.4	53	14.
	Bachelors degree or equivalent	93	30.8	132	36.
	Masters degree or equivalent	31	10.3	113	31.
	Doctoral degree or equivalent	10	3.3	48	13.
Use	<i>How long have you been participating in <Virtual World>?</i>				
	less than 1 month	22	7.3	15	4.2
	more than 1 and less than 3 months	55	18.2	19	5.3
	more than 3 and less than 6 months	105	34.8	26	7.2
	more than 6 and less than 12 months	73	24.2	45	12.
	more than 1 year and less than 2 years	24	7.9	123	34.
	more than 2 years	23	7.6	132	36.
Use Intensity	<i>In an average week, how much time would you say you spend on <Virtual World>?</i>				
	less than 1 hour	20	6.6	14	3.9
	between 1 and 5 hours	30	9.9	63	17.
	between 6 and 10 hours	81	26.8	80	22.
	between 11 and 25 hours	100	33.1	86	23.
	between 26 and 50 hours	52	17.2	60	16.
	between 51 and 75 hours	14	4.6	32	8.9
	more than 75 hours	5	1.7	25	6.9

Table 2. Results of T-test for addictive behaviour between virtual worlds.

Addiction Group*	Mean Addiction (n)		P (F-value)
	1. WOW	2. SL	
HIGH ADDICTION GROUP	69.39 (163)	73.44 (127)	<.001 (13.915)
LOW ADDICTION GROUP	54.61 (111)	48.96 (164)	<.001 (21.713)
NO ADDICTION GROUP	40.25 (28)	44.67 (69)	.208 (1.610)

Table 3. Addiction in virtual worlds.

	<i>n</i> =	Mean (Std. Dev.) for addiction	<i>F</i>	<i>P</i>
Goal-oriented VW	302	61.2583 (12.92321)	36.467	<.001
Experience-oriented VW	360	56.7722 (17.25939)		

Table 4. Virtual world addiction and respondents' demographics.**A. World of Warcraft**

CHARACTERISTIC	1. HIGH ADDICTION	2. LOW ADDICTION	3. NO ADDICTION	P (F-value)	ANOVA
<i>Demographics</i>					
Age	2.17	2.12	1.64	.026 (3.707)	1>3 ^{*a}
Gender	1.32	1.44	1.54	.027 (3.642)	Non Sig. ^b
Education	2.43	2.50	2.61	.632 (.459)	Non-Sig. ^b
<i>Virtual World Interaction</i>					
Use experience	3.20	3.43	3.36	.334 (1.009)	Non Sig. ^b
Use intensity	3.43	3.49	3.80	.091 (2.412)	Non-Sig. ^b

B. Second Life

CHARACTERISTIC	1. HIGH ADDICTION	2. LOW ADDICTION	3. NO ADDICTION	P (F-value)	ANOVA
<i>Demographics</i>					
Age	2.69	2.74	2.58	.604 (.505)	Non Sig. ^a
Gender	1.51	1.59	1.49	.306 (1.189)	Non Sig. ^a
Education	2.55	2.53	2.59	.910 (.094)	Non-Sig. ^a
<i>Virtual World Interaction</i>					
Use experience	4.91	4.77	4.54	.197 (1.632)	Non Sig. ^b
Use intensity	4.30	3.76	3.30	<.001 (10.349)	1>3 ^{***} , 1>2 ^{*a}

Note: ^a Bonferroni; ^b Tamhane's T2 used due to heteroscedasticity; *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$

Table 5. CA and addiction in goal-oriented virtual worlds.

Group*	<i>n</i> =	Mean (Std. Dev.) for addiction	<i>F</i>	<i>P</i>
High CA	145	67.090 (11.747)	69.765	<.001
Low CA	157	55.873 (11.579)		

Notes: $n=302$; * High CA refers to values of 81 or above (above neutral).

Table 6. CA and addiction in experience-oriented virtual worlds.

Group*	<i>n</i> =	Mean (Std. Dev.) for addiction	<i>F</i>	<i>P</i>
High CA	298	56.423 (18.508)	1.667	.198
Low CA	62	58.452 (9.046)		

Notes: *n*=360; * High CA refers to values of 81 or above (above neutral).

Table 7. Addiction and continuance intention in goal-oriented virtual worlds.

Group*	<i>n</i> =	Mean/Std. Dev.	<i>F</i>	<i>P</i>
High continuance intention	169	68.030 (11.991)	83.047	<.001
Low continuance intention	133	55.929 (11.017)		

Notes: *n*=302; * High spending intention refers to values of 13 or above (above neutral).

Table 8. Addiction and continuance intention in experience-oriented virtual worlds.

Group*	<i>n</i> =	Mean/Std. Dev.	<i>F</i>	<i>P</i>
High continuance intention	280	56.754 (18.445)	.002	.962
Low continuance intention	80	56.838 (12.336)		

Notes: *n*=360; * High spending intention refers to values of 13 or above (above neutral).

Table 9. Addiction and spending intention in goal-oriented virtual worlds.

Group*	<i>n</i> =	Mean/Std. Dev.	<i>F</i>	<i>P</i>
High spending intention	140	67.333 (9.878)	103.529	<.001
Low spending intention	162	54.229 (12.484)		

Notes: *n*=302; * High spending intention refers to values of 13 or above (above neutral).

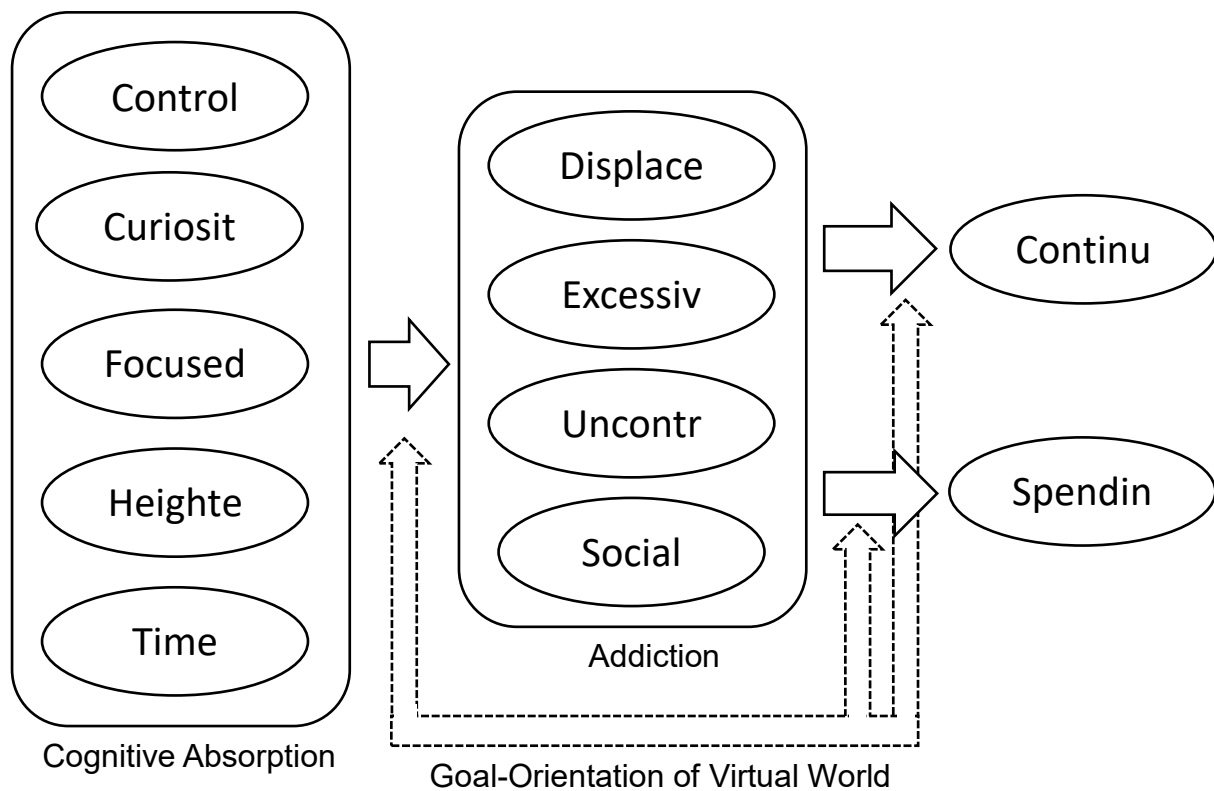
Table 10. Addiction and spending intention in experience-oriented virtual worlds.

Group*	<i>n</i> =	Mean/Std. Dev.	<i>F</i>	<i>P</i>
High spending intention	173	58.075 (18.647)	2.256	.134
Low spending intention	187	55.364 (15.553)		

Notes: *n*=360; * High spending intention refers to values of 13 or above (above neutral).

Table 11. Test results.

Hypothesis	Accept/Reject
H1a: Cognitive absorption positively influences addiction in goal-oriented virtual worlds.	Accept
H1b: Cognitive absorption does not positively influence addiction for experience-oriented virtual worlds.	Accept
H2a: Addiction positively influences continuance intention in goal-oriented virtual worlds.	Accept
H2b: Addiction does not positively influence continuance intention for experience-oriented virtual worlds.	Accept
H3a: Addiction positively influences spending intention for goal-oriented virtual worlds.	Accept
H3b: Addiction does not positively influence spending intention for experience-oriented virtual worlds.	

**Fig. 1.** Research model.

Appendix: Scales and Items

Table A1. Scale items and sources.

<p>Cognitive Absorption [24] (Cronbach's α: WoW=0.843; SL=0.940)</p> <p><i>Temporal Dissociation</i> Time appears to go by very quickly when I am participating in <Name of Virtual World>. Sometimes I lose track of time when I am participating in <Name of Virtual World>. Time flies when I am participating in <Name of Virtual World>. Most times when I get on to <Name of Virtual World>, I end up spending more time that I had planned. I often spend more time on <Name of Virtual World> than I had intended.</p> <p><i>Focused Immersion</i> While participating in <Name of Virtual World> I am able to block out most other out-of-world distractions. While participating in <Name of Virtual World>, I am absorbed in what I am doing. While on <Name of Virtual World>, I am immersed in the task I am performing. When on <Name of Virtual World>, I get distracted by other out-of-world attentions very easily While on <Name of Virtual World>, my attention does not get diverted out-of-world very easily.</p> <p><i>Heightened Enjoyment</i> I have fun interacting with <Name of Virtual World>. Participating in <Name of Virtual World> provides me with a lot of enjoyment. I enjoy participating in <Name of Virtual World>. Participating in <Name of Virtual World> bores me.</p> <p><i>Control</i> When participating in <Name of Virtual World> I feel in control. I feel that I have no control over my interaction with <Name of Virtual World>. <Name of Virtual World> allows me to control my computer interaction.</p> <p><i>Curiosity</i> Participating in <Name of Virtual World> excites my curiosity. Interacting with <Name of Virtual World> makes me curious. Participating in <Name of Virtual World> arouses my imagination.</p>
<p>Addiction [53,60,83] (Cronbach's α: WoW=0.870; SL=0.933)</p> <p><i>Social Sanctions</i> Time spent on <Name of Virtual World> has created real problems in my life, but I keep participating in it. I keep participating in <Name of Virtual World> even though it is causing serious problem in my life. I keep participating in <Name of Virtual World> even though my loved ones can't stand it. Sometimes I feel like my whole life revolves around <Name of Virtual World>. My family members get angry and tell me I spend too much time on <Name of Virtual World>, but I can't stop. I sometimes feel like participating in <Name of Virtual World> is alienating my loved ones.</p> <p><i>Uncontrollable Play</i> Sometimes I only plan to participate in <Name of Virtual World> for a few minutes, and wind up spending hours in front of it. I often participate in <Name of Virtual World> for a longer time than I intended. I often think that I should cut down on the amount of time that I participate in <Name of Virtual World>. I feel like I spend more time in <Name of Virtual World> than I used to in order to feel the same. When I am unable to participate in <Name of Virtual World>, I miss it so much that you could call it "withdrawal".</p> <p><i>Excessive Play</i> <Name of Virtual World> takes up almost all of my leisure time. I spend much more time participating in <Name of Virtual World> than just about anything else.</p> <p><i>Displacement</i> I would be a lot more productive if I didn't spend so much time in <Name of Virtual World>. I would spend more time with hobbies if I didn't spend so much time in <Name of Virtual World>.</p>

Continuance Intention [117]

(Cronbach's α : WoW=0.740; SL=0.908)

I intend to continue participating in <Name of Virtual World> rather than participating in an alternative virtual world.

My intentions are to continue participating in <Name of Virtual World> rather than participating in an alternative virtual world.

If I could, I would continue my participation in <Name of Virtual World>.

Spending Intention (created for study)

(Cronbach's α : WoW=0.747; SL=0.908)

I intend to spend additional virtual money in <Name of Virtual World> in the future.

I would like to increase my spending of virtual money in <Name of Virtual World>.

In the future, I will spend more virtual money in <Name of Virtual World>.

Vitae

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